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A "TALKING BOOK" SYSTEM OF TEACHING BEGINNING READING. FINAL REPORT.

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TWO FEASIBILITY STUDIES WERE CONDUCTED TO OBTAIN EVIDENCE OF THE VALUE OF INSTRUCTING CHILDREN WITH THE TALKING BOOK SYSTEM. SUBJECTS WERE TWO GROUPS OF CHILDREN RANGING IN AGE FROM 5-0 TO 6-1 YEARS. THE CHILDREN MANIPULATED THE EQUIPMENT AND DIRECTED THE MAGNETIC READER IN ORDER TO LEARN TO READ SIX SIGHT WORDS AND THE TWO-WORD SENTENCES CONTAINING THESE WORDS. PRETESTS AND POST-TESTS WERE ADMINISTERED TO MEASURE LEARNING DURING A FIVE- SESSION TRAINING PERIOD. RESULTS INDICATED THAT THE SYSTEM WAS EFFECTIVE FOR CAPABLE PUPILS, BUT WAS UNSATISFACTORY FOR SLOWER CHILDREN. THE NEED FOR REVISION OF THE SIMPLE PAIRED-ASSOCIATE SEQUENCE AND A DIFFERENT SELECTION OF WORDS WAS EVIDENT. EXAMPLES OF THE TESTS AND LESSONS USED ARE INCLUDED IN THE APPENDIXES. REFERENCES ARE LISTED. (MC)

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FINAL REPORT
Title VIIA Project No. 1370

A "TALKING BOOK" SYSTEM

of

TEACHING BEGINNING READING

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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U.S. DEPARTMENT OF
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Office of Education
Bureau of Research

A "TALKING BOOK" SYSTEM

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TEACHING BEGINNING READING

Title VII-A Project Number 1370

by

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OCTOBER, 1967

FOREWORD

The research reported is herein a summary of research conducted in the Department of Education at the University of California, Los Angeles. The research was supported by a grant from NDEA Title VII through the U.S. Office of Education of the Department of Health Education and Welfare.[1] Interim reports were submitted to the U.S.O.E. and in a paper delivered to the annual meeting of the American Educational Research Association, in Chicago, Illinois, February, 1966.

There are many persons who should be given recognition for assisting in the completion of this project. Certainly the authors wish to express sincere appreciation to Mr. Thomas Reece, Assistant Superintendent of the West Los Angeles Elementary School District. His interest in educational research particularly related to meaningful innovation has stimulated the child, teacher, parent and academician. His office assisted graciously in making arrangements in schools in his district.

A special thanks for the many courtesies extended by Miss Dorothy Froeger, Principal of the Canfield Elementary School, as well as to her teaching staff. Appreciation is also due to Mrs. Anderson of the Anderson Nursery School in Santa Monica, California and to Miss Doris V. Brown, Principal of the Breldway Pre-School in Los Angeles. These administrators graciously provided not only an array of subjects but arranged the use of special rooms for testing and the administration of the reading program.

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[1] Evan R. Keislar and John D. McNeil were the principal investigators and Joel E. Strandberg was the research associate. Dr. Strandberg presented the paper, "Experimentation in teaching young children to read using a 'Talking Book' system" at the A.E.R.A. Meeting.

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CHAPTER I

THE PROBLEM

Introduction

The central problem posed by this investigation was to explore the feasibility of a "talking book" system of instruction in beginning reading which automatically provides the pupil with the simultaneous presentation of the sound of a word and the sight of the word.

Current methods of teaching beginning reading either require an adult (usually the teacher) to tell the child the sounds of the printed words or to provide the child with the necessary sounds through phonographs or tape recorders. Neither of these methods permits the beginning reader to obtain the sound of any printed word by himself whenever he needs it as he comes across it in a book. Consequently, the child is handicapped in learning to read words or patterns since no prompt is available immediately.

In the talking book system, the sound of the word is recorded on the page of the book in isomorphic relation to the printed grapheme. The child's attention is directed to each word of the sentence as he hears it. The system is under the control of the child since each time he places the magnetic reader with the arrow above the word, he hears the word instantaneously. The system provides for individual differences since the child can obtain the sound for the word or sentence at any place in the book as often as he requires it. The voice recorded in the book remains unchanged regardless of the number of times the child seeks the sound of the word.

Since the talking book system used in this study makes available an auditory prompt for every printed word the child encounters, it is possible to study the effect of a simple prompting--confirmation procedure to help the child acquire a basic sight vocabulary. Although there are many alter-

native ways of describing this kind of associative learning, in the formulation of association by continguity, Guthrie (1959) states, "What is being noticed becomes the signal for what is being done." In terms of the reading process, the "what is being noticed" is the grapheme(s), the printed form of the word. The "what is being done" is auding, that is, listening with comprehension to the word, or, in overt form, saying the word aloud. Through repeated presentation of the auditory stimulus, while attention is being given to the grapheme, the grapheme becomes a signal to lead the student to respond.

Recent Approaches to Reading Instruction

Several new methods have been developed in recent years to introduce the young child to reading. Among these is the emphasis on phonics which involves teaching the child a method of sounding out individual letters or letter combinations(cf. Flesch, 1955; Daniels and Diak, 1956). The reaction of linguists to this approach is represented by Bloomfield and Barnhard (1961). Bloomfield has prepared materials for the young child which use a highly limited repertoire of words eg. "Can Dan fan Nan?" The constraints, placed upon the preparation of instructional materials for the young child, are so large that, at the beginning at least, only limited classes of words are possible. Fries (1962), for example, stresses the importance of learning spelling patterns as the basic graphemic unit. Unlike the usual phonics approach, Fries would have the beginning reader learn the spelling-to-sound correspondence rules within the context of words.

Another solution to the problem of acquisition of correspondence rules in beginning reading is offered by the i.t.a. program (Initial Teaching Alphabet, Downing, 1963) which has been extensively explored in the schools. By introducing additional letters to bring the total to forty-three a high

degree of regularity in the letter-to-sound rules is obtained. A child, therefore, is required to learn a smaller number of rules--rules which are presumably easier to master and apply.

Other systems of modification involving orthography have been proposed by Malone (1962), who advocates an alphabet with forty characters, and Fry (1964), who makes use of diacritical marks to indicate letter-to-sound relationships.

Prompting in the Teaching of Reading

For all of these methods of reading instruction, as well as for conventional approaches, a fundamental problem is that of supplying an auditory stimulus prompting the learner to give the appropriate vocal response. Where the child can easily obtain the sound of any printed word or part of a word, all methods of reading instruction are facilitated. After the learner has mastered and is able to use the correspondence rules appropriately, he is able to decode for himself the sound equivalents of printed words. Where no auditory stimulus is readily available, there is increased pressure to have the child learn and use such rules. If it is possible for the child to obtain an auditory prompt for any stimulus at any time, the opportunity for providing for individual differences is also greatly enhanced. Some children might need many promptings for a given grapheme, while other children will need only a few.

Studies by Cook and his colleagues demonstrated the importance of promptings in the paired-associate learning. Cook and Kendler (1956) hypothesized that the superiority of prompting over confirmation was partially due to the shorter delay between the stimulus term and the response term in the prompting mode. When the learner had to make a response which was then confirmed by the correct word, there was a much longer interval between the pre-

sentation of the stimulus term and that of the response. Cook(1958) later extended the study using the same materials and established the same results. Here, however, he allowed the training to continue until the mastery of the material occurred. Cook and Spitzer (1959) indicated that prompting without overt practice was superior to confirmation with overt practice. They opened the possibility that a good deal of paired-associate learning might occur simply by having the learner look at words while he is told the associated member of the pair. Their second conclusion (Cook and Spitzer) indicated that the "S - R delay interferes with the process of connecting a response to its proper stimulus." Stolurow and Lippert (1961) found prompting superior to confirmation in short practice periods,while in an overlearning mode, confirmation proved superior to prompting when measured with respect to time.

Technological Aids for Prompting in Beginning Reading

Two different reviews of available audio-visual devices for the teaching of reading (Blank, 1964; and Fay, Bradtmueller, and Summers, 1964) indicated that there was no device, up to that time at least, which provided any way of prompting the beginning reader with the sound of words as he needed them. The closest approximation to such a system is to be found in the Language Master, which provides the learner with sound recorded on a track on a card. The total time of recording per card is about six seconds which permits the beginning reader to hear sounds from a single phoneme to an entire spoken sentence. Where more than one printed word is used the student can not readily determine which sound goes with which word. While the cards do not have a book format, they possess the advantage that the child can be given special practice on the cards and words which he needs. For example, Bland and Keislar (1967) taught young children French through the use of the Language Master. On each of 120 cards a picture was drawn and a sentence des-

cribing the picture in French was recorded. The child was taught to use the sound as a way of prompting himself to give the correct sentence in French. The pupils sorted the picture cards continuously into two piles---those which represented sentences that they still had to learn and those representing sentences which they knew.

Electronics Futures Incorporated (Northaven, Connecticutt) have developed an audio flash card system which operates on essentially the same basis as the Language Master except that the cards remain stationary; ie. the head moves across the card. The Talking Learning Machine (Mattel Toys, Hawthorne, California) utilizes plastic rectangles with letters called Talking Tiles operated in a fashion like that in the Language Master. However, the tiles can be interlocked to form words or sentences. The ReKard Recorder (Magnasync Corporation, North Hollywood, California) provides an entire paragraph with up to a full minute of spoken commentary for the child. This system provides a convenient way of recording the commentary to accompany a full paragraph but it is not particularly applicable for beginning reading since there is no correspondence between the printed word and the sound of that word.

McNeil and Keislar (1963) developed a system of teaching reading which involved the presentation of one or two words by projecting slides on a screen coupled with a tape recording of these.words. This system like the others, however, fails to supply a clear association between a printed word in a sentence (or even a single letter) and the sound of that word (or letter).

O. K. Moore (1962) developed a responsive system which includes an electronically controlled typewriter, an audio system, a rear projection screen, with visuals and a card display. The child starts the program with one operable key on the typewriter. When the key is depressed, the corresponding phoneme is automatically presented to the child over the speaker or

the earphones. The complexity of the system enables the child to progress through words, sentences, paragraphs and stories. The system has been operated by children as young as two and a half years and is currently being tested in a number of centers in the United States.

Atkinson (1967) at Stanford University has used computer assisted instruction to teach reading including word recognition. The electronic display used in this project provides a matrix of consonant and vowel combinations for the child to select upon direction. The initial results have been very encouraging.

The Talking Book System

The apparatus of Moore and Atkinson very clearly provide an opportunity for the child to hear the sound of any word as he looks at that word. While these involve fairly expensive computerized approach they offer large possibilities for branching and selection of the programs as desired. However, a significant gap exists between these sophisticated systems and what is available commercially on a less expensive basis. The talking book system, in design at least, offers the possibility of providing a simple and inexpensive approach to the problem of prompting the student with the auditory stimulus for a given word. We turn now to a description of this method.

There are two major components of the talking book system: First, the book consists of printed text and a magnetic path orientated with an isomorphic relationship, between the aural information recorded on the path and the graphic information. Second, the reader, an electro-mechanical self-propelled device, consists of a magnetic transducer and the necessary electronics to reproduce the magnetically recorded signal into an audio signal which the student auds by means of earphones.

1. The Book. The book contains textual material typed on a primary

typewriter. Directly above the typed words and parallel to the line of type is the magnetic path on which the magnetic signal is imprinted. The aural information recorded magnetically corresponds in length and position to the printed words. The book is opened with pages lying in a plane. A starting position is indicated approximately one inch ahead of the first word on each line (required only at the lower grade levels) by a caret symbol to give a subject a half second to adjust himself to attend the task of auding.

2. The Reader. The "Talking Book" Reader consists of an electro-mechanical assembly two and one half inches long by two inches wide by two inches high. A plastic case (royalite) encases the entire mechanism. The weight of the unit is just under eight ounces. It contains a cadmium-nickel rechargeable battery which supplies power to a governor-controlled direct current motor. The motor circuit is controlled by a mercury switch, which makes contact when the unit is in position to be released on the page. The rate of movement across the page is one and seven-eighths inches per second. The magnetic transducer has an effective track width of twenty-four thousandths of an inch. The audio signal is transmitted to the ear by means of AKG earphones. In addition to the aural information from the book, the unit contains the necessary electronics to amplify the oral response that the subject speaks into the K-58 microphone. The volume of the active audio response is set so that the subject only whispers into the microphone.

3. Use. The operation of the two components is learned with a few minutes of instruction. The subject picks up the "Talking Book" Reader and places the lengthwise edge parallel to and just above the line of print. The arrowhead on the Reader is placed at the caret symbol in the book. The Reader is then released and allowed to travel under its own power across the page. The subject is trained to observe the graphic symbols as the arrowhead

moves above each printed word. If at anytime the signal is not transmitted to the ear, the subject observes that the Reader is crossing the graphic symbol or is too far above the symbols. The subject adjusts the direction or repeats the starting procedure more precisely. The fact that the subject may not hear the signal to be auded while the Reader is moving requires attention on the part of the subject to the task involved. He is automatically rewarded with hearing aural information he can comprehend when he performs his task correctly. Hence, the continuous visual attention to the printed symbol is coordinated with the auding of the aural symbol within a small fraction of a second. At the end of the line the subject picks up the Reader to repeat the task on the next line. If per chance he forgets to pick it up, he soon observes that it will go to the end of the page and stop automatically.

CHAPTER II

METHOD

Problem of the Study

The problem for this empirical study was to determine the feasibility of teaching young children to read through the use of the talking book system described earlier. The major criterion of success was whether, after five days of instruction, kindergarten children would be able to read with comprehension new sentences made up of words taught as sight vocabulary in the program. Two separate studies were undertaken using different groups of kindergarten children.

The Reading Task

A total of six words were taught, three nouns and three verbs, all highly familiar to children: dogs, children, horses, eat, run, play. These words were selected partly because they offered a diversity of sounds with which to test the fidelity of the system. The high frequency sound of S was of special interest in this connection. The nouns were in plural form so as to obviate the necessity of using an article. From these six words, nine sentences were formed. Six were taught in the program and three were saved for the posttest. The sentences taught are shown in the matrix below. The cells denoted by an "X" indicate the sentences, i.e., the combination of words, which were reserved for the criterion test and hence were not taught.

VERBS

NOUNS		eat	run	play
	dogs	taught	taught	X
	children	taught	X	taught
	horses	X	taught	taught

Subjects

To select subjects for these studies, all children were given a pretest to find out whether they could read any of the six words. This test is presented in Appendix A. Children who could read aloud more than two words were dropped from the study. All subjects finally selected were therefore unfamiliar with the task to be taught.

For the first study, the sample consisted of kindergarten children, almost all of whom were five years of age, who were enrolled in three private nursery schools. On the basis of the pretest result, eleven of these children were excluded from the experiment because they could already read more than two of the words to be taught. Of the 15 children selected (eight girls and seven boys), 11 were unable to read any of the six words, 2 subjects could read one word, and 2 subjects could read two. These subjects ranged in age from 5-0 to 6-1 with a mean of 5-7. On the basis of the Peabody Picture Vocabulary Test, their intelligence quotients ranged from 54 to 125 with a mean of 104.

For the second study, 28 children enrolled in a kindergarten of a Los Angeles elementary school were used for the investigation. Of these, two were excluded because they could read more than a third of the words; two were absent and had to be dropped. The 24 subjects who were in the study (15 boys and 9 girls) ranged in age from 5-2 to 5-10 with a mean of 5-5. On the Peabody Picture Vocabulary Test, intelligence quotients ranged from 93 to 142 with a mean of 114.

Procedure

One of the experiments was carried out in a nursery school setting and the other in a public school. Since the problem, the procedures and the administration of the two experiments were identical we can regard the second experiment essentially as a replication of the first.

In each of the two studies, the experimenter brought the subjects one at a time to an unused room where the experiment was conducted. Both the experimenter and the subject sat at a low table usually facing each other.

Pretest of Reading Words. In giving the pretest, the experimenter said to the subject, "We are going to play a game with words. First, I want to find out if you know some words. When I show you the card, you say the word." The experimenter presented the six pretest cards one at a time to the subject with a verbal direction to "Say the word." A tally was kept of the words tested correctly. Children who knew too many words, as explained earlier, were returned to their classes.

Visual Discrimination Training. Following the presentation of the reading pretest each subject was given training in visual discrimination of the words to be learned in the reading program. As each card was shown to the subject, the experimenter said, "This is the top word. You point to the top word." Subject pointed to the top word. The experimenter continued, "These are the bottom words. You point to the bottom words." Subject pointed to the bottom words. The experimenter then asked, "You point to the bottom word that looks like the top word." The subject then pointed. If the subject made an error, the experimenter said, "Look at the top word more carefully and try again." This training was repeated on each of the two succeeding days at the beginning of the talking book lesson. (See Appendix B.)

Training Lesson for Talking Book Program. Each child was brought into a separate room for special training. This orientation lesson is presented in Appendix C. A research assistant introduced the child to the equipment and presented the child with the lesson. On the training day only, she offered guidance with respect to the handling of the equipment, but at no time did she say aloud the words being used for instruction, even though the child might have said the word incorrectly.

The Lessons in the Program. Following the orientation lesson, on each day for five days, a lesson from the talking book was given. These instructional programs in the talking book are presented in Appendix D. The general procedure of the lessons was to introduce a word along with its sounds at the beginning of a line. The word and sound were repeated again at the end of the line. On the second line, the prompted word was presented again with sound. Next on this line the word appeared again but printed in red without sound. The child was to pronounce aloud by himself the word printed in red. Now the child's response was followed at the end of the line by a confirmation process in which word and sound again were presented. The learning format, therefore, was essentially that used for paired-associate learning. After a certain amount of review of individual words, two-word sentences were introduced by the same procedure.

The Posttest. After taking Lesson 5 on the fifth day, the subject was brought to another table and given the reading posttest (see Appendix E.) This test of 20 items included both recall and recognition questions, previously encountered combinations of words as well as new ones. As the experimenter presented the subject with each of the 20 cards, he said, "Say the word or words." For the last six cards the experimenter said, "Point to the word that says children (or run, dogs, play, horses, or eat as the card required). The subjects' responses were scored and also recorded on magnetic tape for later verification of the results. Children were not told whether their answers were correct or not, but they were all given a hearty commendation for their performance.

CHAPTER III

RESULTS AND CONCLUSIONS

Posttest

The complete data for all subjects of both studies is presented in Appendix F. In this appendix, for each child there are given his chronological age, sex, pretest score and Peabody Picture Vocabulary Test Data. There follows the score (right = 1 and wrong = 0) which the child made on each of the twenty items of the posttest. The child's total score on the test appears in the final column. At the bottom of the table is shown the difficulty level, expressed in percent, of each item on the posttest.

The results of each of the two studies, as well as the combined results, are presented in Table 1. Here are given the frequency distributions of the posttest scores for the 15 subjects in Study 1, the 24 subjects in Study 2, and the 39 subjects in the two studies combined. The last distribution is presented graphically in Figure 1. The mean of 14.6 in the first study does not differ significantly from the mean of 12.4 in the second study. All distributions tend to be bimodal; pupils seem to do either very well or rather poorly. With the exception of three cases, all of the subjects either made perfect or near-perfect scores, i.e., they made no more than two mistakes, or they made less than half the total possible score.

Just over 50 percent of the total number of pupils made scores which were perfect or almost perfect; twenty children obtained scores of either 18, 19, or 20. On the other hand, 16 or 41 percent of the pupils made unsatisfactory scores; the posttest scores for this group ranged from 1 to 9.

As is indicated in Appendix F, the difficulty level of the word recognition items on the posttest was much lower than for the oral word reading items.

TABLE I.

Posttest Achievement of Pupils in Studies 1 and 2.

Posttest Score	Study 1. Frequency	Study 2. Frequency	Total Frequency
20 (Maximum)	6	11	17
19	2	0	2
18	0	1	1
17	0	0	0
16	0	0	0
15	0	0	0
14	1	0	1
13	1	0	1
12	1	0	1
11	0	0	0
10	0	0	0
9	0	1	1
8	1	1	2
7	1	2	3
6	0	2	2
5	1	1	2
4	0	2	2
3	0	1	1
2	1	0	1
1	0	2	2
Total N	15	24	39
Mean	14.6	12.4	13.3
Standard Deviation	6.4	7.7	7.2

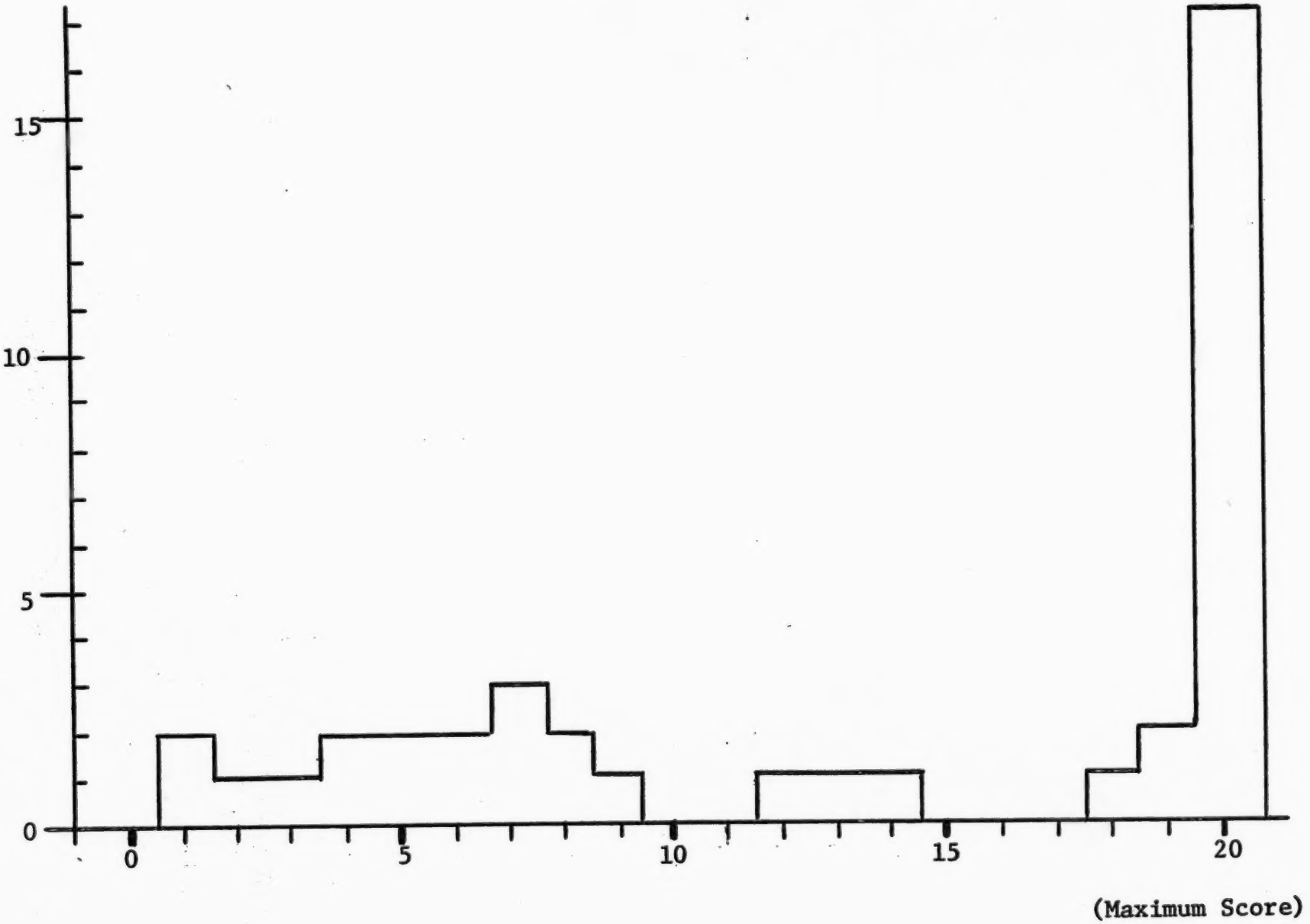

Figure 1 : Histogram of Posttest Scores for all Subjects.

The average difficulty level of the six recognition items was 19.3 percent, while the corresponding figure for the six oral reading items was 36.0 percent.

There appeared to be only a slight increase in difficulty for the new sentences. The average difficulty level of the two-word sentences previously encountered in the program was 38.2, while the corresponding figure for the new two-word sentences was 42.7.

As might be expected, there was a significant correlation between final posttest scores and the scores on the Peabody Picture Vocabulary Test. This correlation based on 38 subjects was .41, indicating a moderate relationship for this group of children.

The performance on the posttest was also related to the pretest scores. As was indicated earlier, children who knew more than two out of the six words were excluded from the study. Of the ten children who knew one or two words on the pretest, nine made perfect scores on the posttest. Consequently, 90 percent of this group of children were able to profit quite adequately from the instruction. The remaining 29 children knew, on the pretest, none of the words taught. Of this group, 38 percent obtained perfect or near-perfect scores (missing at most two items). The other children in this group performed unsatisfactorily on the posttest.

Observational Data

Information about the acoustical effectiveness of this system was obtained by noting oral responses of the children as they were prompted by the talking book. Appendix E indicates where in the program the children were prompted to say words by means of recorded speech over the earphones; there were no context or pictorial stimuli to provide additional assistance. Observation of the children's performance under these conditions showed that

in only one case did the child respond incorrectly to the auditory prompt from the talking book. In this instance, (since the experimental assistants were required not to interfere in any way with what the child said), this one child continued to misread this word throughout the program. Of course, it was possible that this error had been acquired elsewhere, outside of this experimental setting. With this one exception, it was concluded that the sound fidelity of the talking book system was quite adequate since young children could understand what was being said. The low performance of many children on the posttest, therefore, can not be ascribed to poor fidelity of sound reproduction.

Children were also observed to see how well they could handle the equipment. As indicated earlier, a special training lesson (presented in Appendix C) was given the subjects prior to their use of the Talking Book. At the end of this orientation or training lesson, practically all children appeared to be quite able to handle the magnetic reader in relation to the pages of the Talking Book. In a few cases some of the children had additional difficulty, but this was cleared up very quickly as they proceeded through the first or second lesson.

Informal observations also indicated that practically without exception these children looked forward to coming each day, not only for the instruction, but for the posttest as well. One major factor appeared to be the novelty of the talking book system. This source did not seem to decrease over the 5 days of instruction, although it would undoubtedly disappear with time as the children continued to work with such materials. Important in capturing the attention and interest of the children was the self-propelled feature of the magnetic reader, which was under the control of the child if he

so chose. For many of the children it was obvious that they were delighted in being able to read even a few words. Two or three somewhat quiet and reserved children were noted during reading instruction to respond enthusiastically; this high level of excitement carried over on their return to the regular class groups where they talked animatedly about their experience.

Conclusions

These two feasibility studies were carried out to obtain evidence of the potential value of instructing young children through the use of a talking book system. The task was to learn to read six words on a sight basis as well as the two-word sentences formed from these words. The children ranged in age from 5-0 to 6-1 years and thus constituted a group somewhat younger than pupils beginning first grade, where reading is generally introduced. Several conclusions seem appropriate as a result of this investigation.

(1) The children were clearly able to manipulate the equipment, to direct the magnetic reader appropriately and to work with the materials by themselves.

(2) The children heard the words clearly enough through their earphones to be able to repeat them. The fidelity of the system, therefore, seems quite adequate for purposes of communication. For those preparing instructional materials in reading it offers a method of making available auditory prompts to the learner.

(3) After five sessions of auto-instruction, totaling approximately sixty minutes, over half of the children showed perfect or almost perfect mastery of the reading task.

(4) Slightly less than half of these subjects showed unsatisfactory performance; their posttest scores were less than 60 percent of the maximum. Children with scores at a simple chance level of one or two points showed no evidence of learning whatsoever. The system, therefore, as it has been

described, was not effective for approximately half these children.

(5) There was a clear relationship between success on the posttest and the mental ability of the child as measured by the Peabody Picture Vocabulary Test; those with low scores on this test tended to do poorly on the reading posttest.

(6) There was also a relationship between the pretest and posttest scores. Ninety percent of the children who knew one or two words at the beginning of the instruction make perfect scores on the posttest. Of the children who knew none of the words on the pretest, approximately one-third made perfect or near-perfect scores on the posttest; the rest of these children did not show adequate learning.

(7) Children practically without exception were highly interested and attentive. The novelty was great enough for this short period so that no other methods of providing motivation seemed necessary.

(8) In sum, the system was very effective with the more capable children, but the slower pupils did not show satisfactory progress. Since the mechanical and acoustical features of the system seem adequate, it would appear that the instructional sequence should be revised particularly to aid this slower group. Althought it is quite possible that the program is too short for these pupils, it is more likely that a different selection of words should be made. Furthermore, the program should involve something more than a simple paired-associate sequence. Whether improved programs will allow these less capable children to move ahead adequately is a focus for further study.

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APPENDIX A

PRETEST

ITEM NO.	PRINTED WORDS SHOWN ON CARD	EXPERIMENTER'S INSTRUCTIONS
1.	children	"Say this word."
2.	dogs	"Say this word."
3.	horses	"Say this word."
4.	run	"Say this word."
5.	eat	"Say this word."
6.	play	"Say this word."

APPENDIX B

VISUAL DISCRIMINATION TRAINING FOR READING PROGRAM

CARD #	EXPERIMENTER INSTRUCTIONS TO THE STUDENT ON REVERSE SIDE OF CARD	VISUALS FRONT OF CARD		
1.	A. This is the top word. experimenter point		cat	
	B. These are the bottom words. experimenter point	boy	airplane	cat
	C. You point to the bottom words. - pupil point			
2.	A. Point to the top word.		cat	
	B. Now point to the bottom word that looks just like the top word.	boy	airplane	cat
3.	A. Point to the top word.		children	
	B. Now point to the bottom word that looks just like the tope word.	children	run	eat
4.	A. Point to the top word.		eat	
	B. Now point to the bottom word that looks just like the top word.	horses	eat	children

VISUAL DISCRIMINATION TRAINING FOR READING PROGRAM

CARD #	EXPERIMENTER INSTRUCTIONS TO THE STUDENT ON REVERSE SIDE OF CARD	VISUALS FRONT OF CARD		
5.	A. Point to the top word.		run	
	B. Point to the bottom word that looks like the top word.	run	eat	play
6.	A. Point to the top word.		play	
	B. Point to the bottom word that looks like the top word.	horses	children	play
7.	A. Point to the top word.		dogs	
	B. Point to the bottom word that looks like the top word.	play	eat	dogs
8.	A. Point to the top word.		dogs eat	
	B. Point to the bottom word that looks like the top word.	dogs eat	dogs run	horses eat
9.	A. Point to the top word.		horses play	
	B. Point to the bottom word that looks like the top word.	horses run	horses play	dogs play

VISUAL DISCRIMINATION TRAINING FOR READING PROGRAM

CARD #	EXPERIMENTER INSTRUCTIONS TO THE STUDENT ON REVERSE SIDE OF CARD	VISUALS FRONT OF CARD		
10.	A. Point to the top word.		children play	
	B. Point to the bottom word that looks like the top word.	children eat	children play	dogs run
11.	A. Point to the top word.		horses run	
	B. Point to the bottom word that looks like the bottom word.		dogs eat	horses run
12.	A. Point to the top word.		children play	
	B. Point to the top word that looks like the top word.	dogs eat	children play	children eat

APPENDIX C

TALKING BOOK TRAINING LESSON

Directions given by experimenter: the name of the subject is to be inserted in place of the blank lines.

1. Good morning, _____(s)_____.
2. I want to show you how to read this Talking Book by using this little box. (Open book to first blank page.)
3. This little box has wheels on the bottom. See? (Point to the wheels)
4. When you place the wheels on the Book and let go, the box moves <u>like this</u>. (experimenter demonstrates)
5. _____(s)_____, you place the wheels on the Book and let the box go.
6. To stop the box, we catch it and pick it up <u>like this</u>.
7. _____(s)_____, you catch the box and pick it up. Very good.
8. This is a blue name.
9. _____(s)_____, you point to the blue name.
10. When you put it down to rest, always have the blue name up <u>like this</u>.
11. When you pick up the box, use this (left) hand and put it into your other (right) hand <u>like this</u>.
12. _____(s)_____, you pick the box up and put it into your other (right) hand and put it down again. Very good.
13. This is a word on the white paper.
14. _____(s)_____, you point to the word on the white paper.
15. This is a guide for the box to move by.
16. You move your finger along the top edge of the guide. Watch me. Now I will pick up the box and put the wheels on the Book so that the box

TALKING BOOK TRAINING LESSON

will move along the guide, like this. Now you do it. ____(s)____, you pick up the box and put the wheels on the Book so that the box will move along the guide.

17. This is the start of the guide.

18. ____(s)____, you point to the start of the guide.

19. This is an arrow on the box.

20. ____(s)____, you point to the arrow on the box.

21. We put the arrow on the box at the arrow on the guide, like this.

22. ____(s)____, you put the arrow on the box at the arrow on the guide, let go, and then catch it.

23. Have you heard anything from the Talking Book yet? No. Well to hear we have to put on earphones. Let me plug them in for you.

24. ____(s)____, you put the box with the arrow at the start of the guide, let go, and then catch it.

25. Did you hear anything? What did you hear?

26. The Talking Book wants you to learn some words. As you listen to the word, you are to look at the word. You have to watch the box go by the word. It's easy to see the word, too. You will hear the word "cats". Now, you listen to the top line. Isn't it easy? Sure it is.

27. If you look at this page you see some words in black. You point to the black words. You listen to them by letting The Talking Book talk to you.

TALKING BOOK TRAINING LESSON

CATS CATS

28. Some of the words are in red. _____(s)_____, you point to the red word. Whenever you come to a red word, "say the word."

CATS CATS

29. After you say the word, you can hear the word again by listening to the Talking Book.

30. Let's practice the bottom line. (Prompt vocalization) You have heard the word "cats." The Talking Book wants you to learn these words. Now let's listen to the top line of this page.

MEN MEN

MEN MEN MEN

MEN MEN MEN

CATS CATS CATS

MEN MEN MEN

MEN MEN MEN

MEN MEN

CATS CATS

CATS CATS

APPENDIX D

THE TALKING BOOK READING PROGRAM

Lesson 1

Note: 1. The word or words without the underline had sound reproduced simultaneously with arrow traversing the word.

2. Underlined words had no sound. They were printed in red. The subject was trained to say the word or words as the arrow traversed the word or words printed in red.

Page No.	Frame No.	Appearance of words on each line		
1	1	dogs		dogs
1	2	dogs	dogs	dogs
2	3	children		children
2	4	children	children	children
3	5	dogs	dogs	dogs
3	6	children	children	children
3	7	children	children	children
4	8		children	children
4	9		dogs	dogs
5	10		dogs	dogs
5	11		children	children
5	12		dogs	dogs

APPENDIX D CONTINUED

THE TALKING BOOK READING PROGRAM

Lesson 2

Page No.	Frame No.	Appearance of words on each line		
1	1	children	children	children
1	2	dogs	dogs	dogs
2	3	run		run
2	4	run	run	run
2	5		children	children
3	6	eat		eat
3	7	eat	eat	eat
3	8	run	run	run
4	9	eat	eat	eat
4	10	run	run	run
4	11	eat	eat	eat
5	12		run	run
5	13		eat	eat
6	14	children eat		children eat
6	15	children eat	children eat	children eat
6	16		children eat	children eat
7	17	dogs eat	dogs eat	dogs eat
7		dogs run	dogs run	dogs run
8			dogs run	dogs run
8			children eat	children eat

APPENDIX D CONTINUED

THE TALKING BOOK READING PROGRAM

Lesson 3

Page No.	Frame No.	Appearance of words on each line		
1	1	children	children	children
1	2	dogs eat	dogs eat	dogs eat
1	3	run	run	run
2	4	children eat	children eat	children eat
2	5		dogs eat	dogs eat
2	6		dogs run	dogs run
3	7	horses		horses
3	8	horses	horses	horses
4	9		horses	horses
4	10	horses run	horses run	horses run
4	11	children eat	children eat	children eat
5	12	dogs run	dogs run	dogs run
5	13		horses run	horses run
5	14		dogs run	dogs run
6	15		children eat	children eat
6	16		dogs eat	dogs eat
6	17		horses run	horses run

APPENDIX D CONTINUED

THE TALKING BOOK READING PROGRAM

Lesson 4

Page No.	Frame No.	Appearance of words on each line		
1	1	horses	horses	horses
1	2		horses	horses
1	3	dogs eat	dogs eat	dogs eat
2	4	dogs run	dogs run	dogs run
2	5		horses run	horses run
2	6	children eat	children eat	children eat
3	7		children eat	children eat
3	8		dogs eat	dogs eat
3	9		horses run	horses run
4	10	play		play
4	11	play	play	play
5	12	children play		children play
5	13	children play	children play	children play
5	14	horses play	horses play	horses play
6	15		dogs eat	dogs eat
6	16		horses play	horses play
7	17		dogs run	dogs run
7	18		horses run	horses run
7	19		children play	children play

APPENDIX D CONCLUDED

THE TALKING BOOK READING PROGRAM

Lesson 5

Page No.	Frame No.	Appearance of words on each line		
1	1	horses run	horses run	horses run
1	2	children play	children play	children play
2	3		horses play	horses play
2	4		children play	children play
3	5	dogs eat	dogs eat	dogs eat
3	6	dogs run	dogs run	dogs run
4	7		dogs eat	dogs eat
4	8		dogs run	dogs run
4	9		horses run	horses run
5	10		children play	children play
5	11		children eat	children eat
5	12		dogs eat	dogs eat
6	13		dogs run	dogs run
6	14		horses play	horses play
6	15		dogs eat	dogs eat
7	16		children play	children play
7	17		horses run	horses run
7	18		children eat	children eat
8	19		dogs run	dogs run
8	20		horses play	horses play

APPENDIX E

TALKING BOOK READING PROGRAM POST-TEST

Item No.	Printed Words Shown on Card			Experimenter's Instructions
1	children			"Say this word."
2	dogs			"Say this word."
3	horses			"Say this word."
4	run			"Say this word."
5	eat			"Say this word."
6	play			"Say this word."
7	dogs run			"Say these words."
8	children run			"Say these words."
9	horses run			"Say these words."
10	horses play			"Say these words."
11	dogs eat			"Say these words."
12	children play			"Say these words."
13	dogs play			"Say these words."
14	horses eat			"Say these words."
15	children	dogs	horses	"Point to the word that says 'children'."
16	dog	horses	children	"Point to the word that says 'horses'."

APPENDIX E

TALKING BOOK READING PROGRAM POST-TEST CONCLUDED

Item No.	Printed Words Shown on Card			Experimenter's Instructions
17	horses	children	dogs	"Point to the word that says 'dogs'."
18	run	horses	children	"Point to the word that says 'run'."
19	horses	play	eat	"Point to the word that says 'play'."
20	eat	dogs	children	"Point to the word that says 'eat'."

APPENDIX F

Complete Data for Subjects in Study 1 and 2.

STUDY 1.

Student Number	Sex	Age Yr.--Mo.	P.P.V.T. Score	P.P.V.T. I.Q.	Pretest Score	Posttest Items (See Appendix E) 1	2	3	4	5	6
1.	M	5-5	60	118	0	1	1	1	1	1	1
2.	M	6-1	62	113	0	1	1	1	1	1	1
3.	M	5-4	61	120	2	1	1	1	1	1	1
4.	M	6-0	68	120	0	1	1	1	1	1	1
5.	F	5-0	56	111	1	1	1	1	1	1	1
6.	F	5-3	55	109	2	1	1	1	1	1	1
7.	F	5-10	42	73	0	1	1	1	1	1	1
8.	F	5-7	64	117	0	1	1	1	1	1	1
9.	F	6-1	58	105	0	1	1	1	1	1	1
10.	F	5-10			0	0	1	1	1	0	1
11.	M	5-8	56	101	1	0	1	0	1	1	1
12.	F	5-3	58	114	0	0	1	0	0	0	0
13.	M	5-10	55	99	0	1	0	0	0	0	1
14.	M	5-11	62	113	0	0	0	0	1	1	0
15.	F	6-0	32	54	0	0	0	0	0	0	0

STUDY 1 Post test items (See Appendix E)

Student Number	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total Right
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
8	1	1	1	1	1	1	1	0	1	1	1	1	1	1	19
9	1	1	1	1	1	1	1	1	1	0	1	1	1	1	19
10	0	1	0	1	0	0	1	1	1	1	1	1	1	1	14
11	1	0	0	0	1	0	1	0	1	0	1	1	1	1	12
12	1	0	0	0	0	0	0	0	1	1	1	1	1	1	8
13	0	0	0	0	1	0	0	0	0	1	1	1	1	0	7
14	1	0	0	0	1	0	0	0	0	0	0	0	1	0	5
15	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2

Complete Data for Subjects in Study 1 and 2.

STUDY 2.

Student Number	Sex	Age Yr.-Mo.	P.P.V.T. Score	P.P.V.T. I.Q.	Pretest Score	Post Test Items (See Appendix E) 1	2	3	4	5	6
1.	F	5-2	73	142	0	1	1	1	1	1	1
2.	F	5-2	65	127	2	1	1	1	1	1	1
3.	F	5-5	68	133	2	1	1	1	1	1	1
4.	M	5-8	72	133	0	1	1	1	1	1	1
5.	M	5-6	55	99	0	1	1	1	1	1	1
6.	F	5-5	70	136	2	1	1	1	1	1	1
7.	F	5-7	55	99	1	1	1	1	1	1	1
8.	M	5-4	56	111	1	1	1	1	1	1	1
9.	F	5-10	63	115	0	1	1	1	1	1	1
10.	M	5-8	65	119	0	1	1	1	1	1	1
11.	M	5-9	52	93	1	1	1	1	1	1	1
12.	M	5-10	66	121	0	1	1	1	1	1	1
13.	F	5-4	52	103	0	1	1	0	0	0	0
14.	M	5-6	57	103	0	1	0	1	1	0	0
15.	M	5-4	55	109	0	0	0	0	0	0	0

STUDY 2 Post test items (See Appendix E)

Student Number	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total Right
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
12	1	1	1	0	1	0	1	1	1	1	1	1	1	1	18
13	0	1	0	0	0	0	0	0	1	1	1	1	1	1	9
14	0	0	0	0	0	0	0	0	1	1	1	1	1	0	8
15	0	1	1	0	1	0	0	0	1	1	0	1	1	0	7

Complete Data for Subjects in Study 1 and 2

STUDY 2.

Student Number	Sex	Age Yr.-Mo.	P.P.V.T. Score	P.P.V.T. I.Q.	Pretest Score	Post Test Items (See Appendix E) 1	2	3	4	5	6
16.	M	5-8	57	103	0	0	1	0	1	0	0
17.	M	5-3	62	122	0	0	1	0	0	0	0
18.	M	5-2	52	103	0	0	0	0	0	0	0
19.	F	5-2	54	107	0	0	0	0	0	0	0
20.	M	5-2	58	114	0	0	0	0	0	0	0
21.	M	5-6	67	123	0	0	0	0	0	0	0
22.	F	5-2	56	111	0	0	1	0	0	0	0
23.	M	5-2	52	103	0	0	0	1	0	0	0
24.	M	5-2	54	107	0	0	0	0	0	0	0
Total wrong out of maximum 39						15	11	15	13	16	15
Item Difficulty Level in percent						38	28	38	33	41	38

STUDY 2 Post test items (See Appendix E)

Student Number	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total Right
16	0	0	0	0	0	0	0	0	1	1	1	1	0	1	7
17	0	0	1	0	0	0	1	0	0	0	1	1	1	0	6
18	0	1	0	0	0	1	1	0	1	1	1	0	0	0	6
19	0	0	0	0	0	0	0	0	0	1	1	0	1	1	4
20	0	0	0	0	1	0	0	0	0	0	1	0	1	1	4
21	0	0	0	1	0	0	0	0	0	1	0	1	0	1	4
22	0	0	0	0	0	0	0	0	0	1	0	0	1	0	3
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Total wrong out of maximum 39															
	15	14	17	17	13	19	14	18	10	7	7	8	6	8	
Item Difficulty Level in percent															
	38	36	41	43	33	46	36	46	25	18	18	20	15	20	